



Module Assembly at Wuhan

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Outline

- Overview of Wuhan status
- Lab preparations
- R&D activities at Wuhan
 - Vision control software
 - Chip-FPC interconnections
- Plan at Wuhan

Overview of Wuhan status

- Application to import the baseline HIC machine was approved by MOE and MOF in end of July, 2015, and the budget is available by the support of CCNU.
- Technical agreement was signed between CCNU and IBS in November, 2015.
- Contract was signed by IBS and CCNU representative trade company in November, 2015.
- Clean room preparation at ISO6 level was approved by CCNU in November, and is under the phase of inviting tenders.
- A PhD student, Chaosong Gao, has been working on chip design at CERN since 2013. Ping Yang was back to CCNU in 2015.
- A PhD student, Mangmang An has been starting the chip testing and assembly training at CERN since this November.
- R&D activities on the module assembly system are on-going as planed.

Overview of Wuhan status – HIC machine procurement



Customer: Central China Normal University (CCNU)
Institute of Particle Physics
Project: 23597
Filename: Technical agreement 20151104_Institute
of Particle Physics_version 03
Last update: 2015-11-06
Author: IBS Precision Engineering BV
Pages: 5

Issued on Nov. 12, 2015

Technical Agreement 23597 for:

Automated
for the H
of the ALIC

合同 CONTRACT

Contract No: J15NL51819
Date of Sign: 2015-11-11

Issued on Nov. 11, 2015

买 方: 湖北中电进出口有限公司
The Buyer: HUBEI CEN-TRONIC IMPORT & EXPORT CO., LTD.
ADD: 23/F JIANG TIAN PLAZA, 586 WULUO ROAD, WUHAN, HUBEI, CHINA
TEL: +0086 27 87885904 FAX: +0086 27 87655606
ATTN: Liu huyang E-mail: LYLE626@163.COM & Anne9989@163.com

卖 方: IBS Precision Engineering BV
The Seller: IBS Precision Engineering BV
Address: Esp 201 - 5633AD Eindhoven - Netherlands
Tel: +31 40 2901270 Fax: +31 40 2901279

此合同由买卖双方订立, 依据以下规定的条款和条件, 卖方同意出售, 买方同意购进下:
This contract is made between the Buyer and the Seller. Whereby the Buyer agrees to buy and the S
mentioned commodity on the terms and conditions stipulated below:

1. 商品名称、规格、数量及金额: Description of the Commodity, Specifications, Quantities and Amount

序号 Item No.	商品名称 Description	数量 Q'ty	
1	ALICE Integrated Circuit Inspection and Assembly Machine MODEL: ALICIA 硅像素芯片自动化系统	One set	EU
TOTAL AMOUNT (DAP WUHAN AIRPORT, CHINA)			
(DETAILS PLEASE SEE ATTACHMENT TO THIS CONTRACT)			
SAY EUR ONE HUNDRED SIXTY TWO THOUSAND FOUR HUNDRED AND FORTY			

BANK COPY

IRREVOCABLE DOCUMENTARY CREDIT APPLICATION

To: **CHINA MINSHENG BANKING CORPORATION LIMITED** Date

Issuing Bank: China Minsheng Banking Corporation Limited	Irrevocable Documentary Credit	Number
Office:		
Address:		
Cable:		
Telex:		
Fax:		
Place and date of issue	Date and place of expiry 2017/03/21 IN Netherlands	

Partial shipments
☐ allowed ☒ not allowed

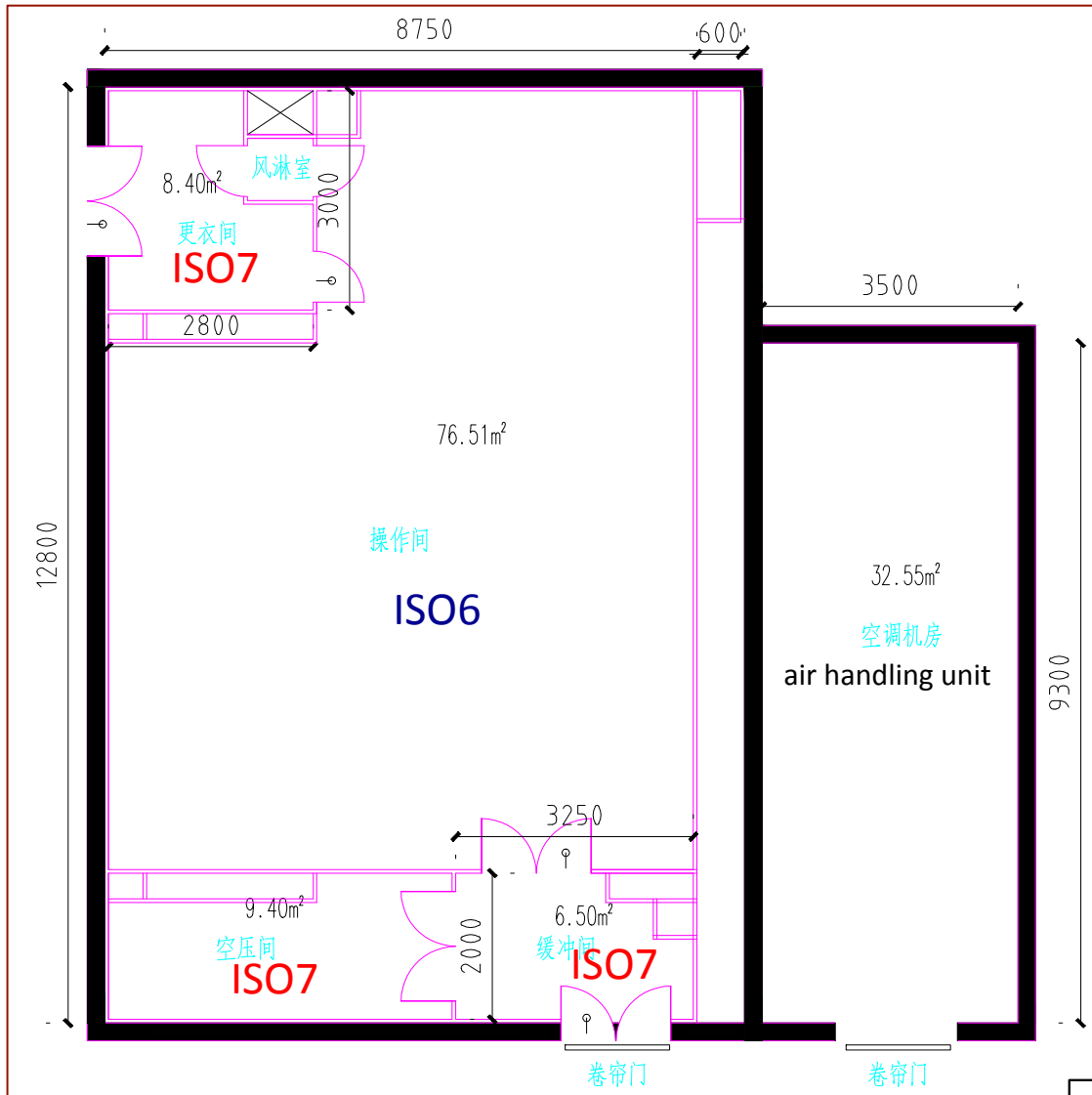
Transshipment
☒ allowed ☐ not allowed

Bank
☐ by deferred payment at
against the documents detailed herein
☒ and beneficiary's draft for 100% of contract value
at SIGHT
on US

Loading on board/dispatch/taking in charge at/on
MAIN AIRPORT IN NETHERLANDS
not later than **Mar.1st, 2017**
for transportation to: **WUHAN AIRPORT, CHINA**

Issue the L/C 3-months or half-year earlier
than the delivery date?

Lab preparations



Clean room design plan

1. Construction of clean room was approved by CCNU this November, and budget is available.
2. Inviting for tenders in December
3. Design requirements:
 - Ground floor, vehicle access
 - Clean level: ISO6 (1000)
 - Total area: 110 m²
 - ISO6 level area: ~ 75 m² operation area
 - ISO7 level area: ~ 35 m² (8 m² locker room including air shower + 9 m² air compressing room + 6 m² buffer area)
 - Controllable temperature: 20 ± 2 °C
 - Humidity: $45\% \pm 15\%$
 - ESD flooring or conductive PVC flooring
 - Noise level ≤ 60 dB

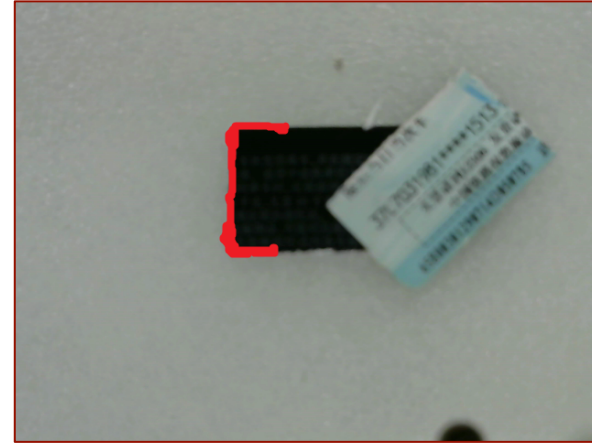
R&D activities at Wuhan – Vision control software

- Image contour matching algorithm was developed to control the test stand automatically in X/Y/Z/ ϕ dimensions.
- Matching precision at one-pixel level

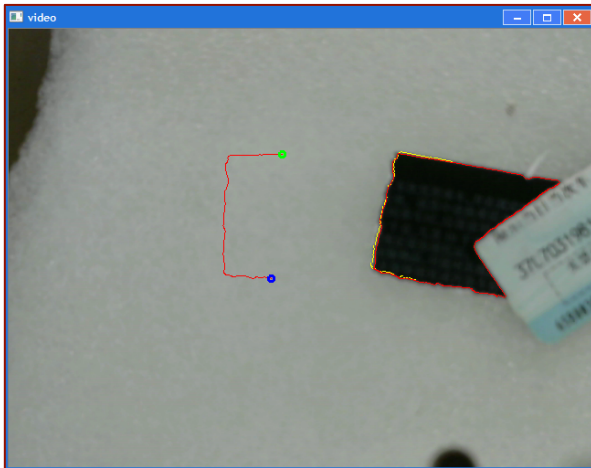
Step 1: prepare reference scene



Step 2: marker a feature contour



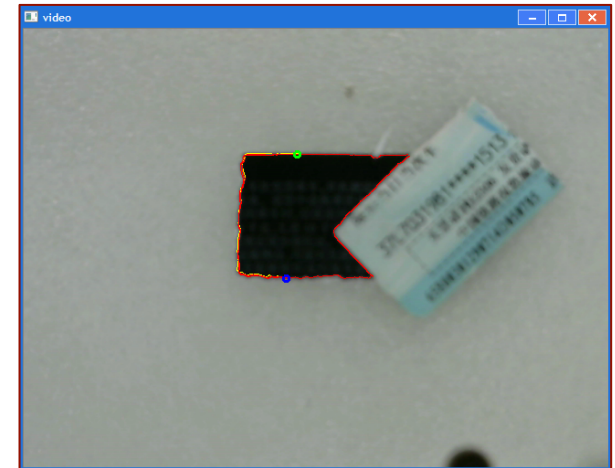
Step 3: recognized feature contours before matching



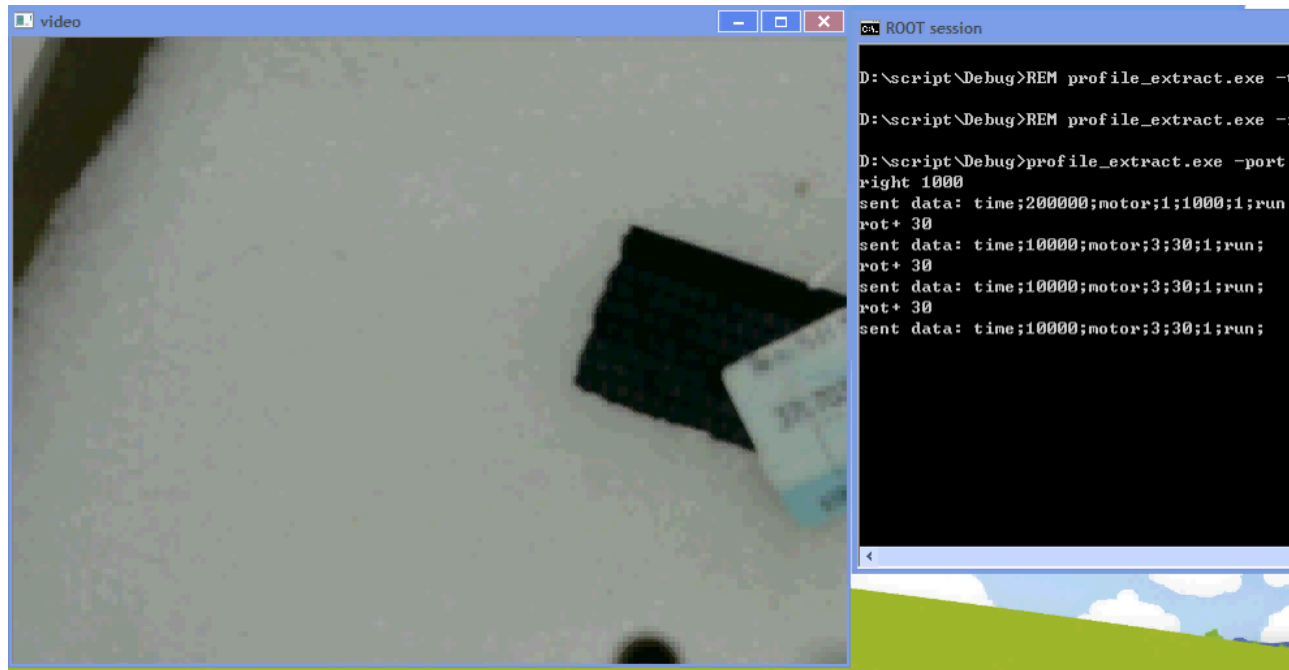
Step 4: Automatically matching



Step 5: recognized feature contours after matching



R&D activities at Wuhan – Vision control software



Script: mc.txt

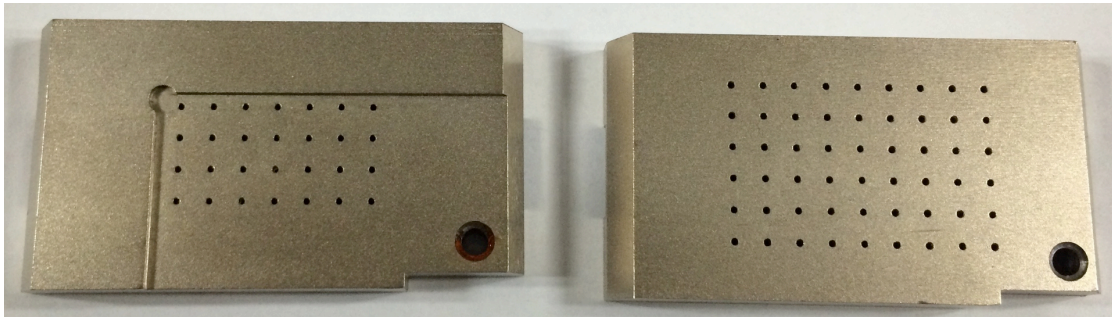
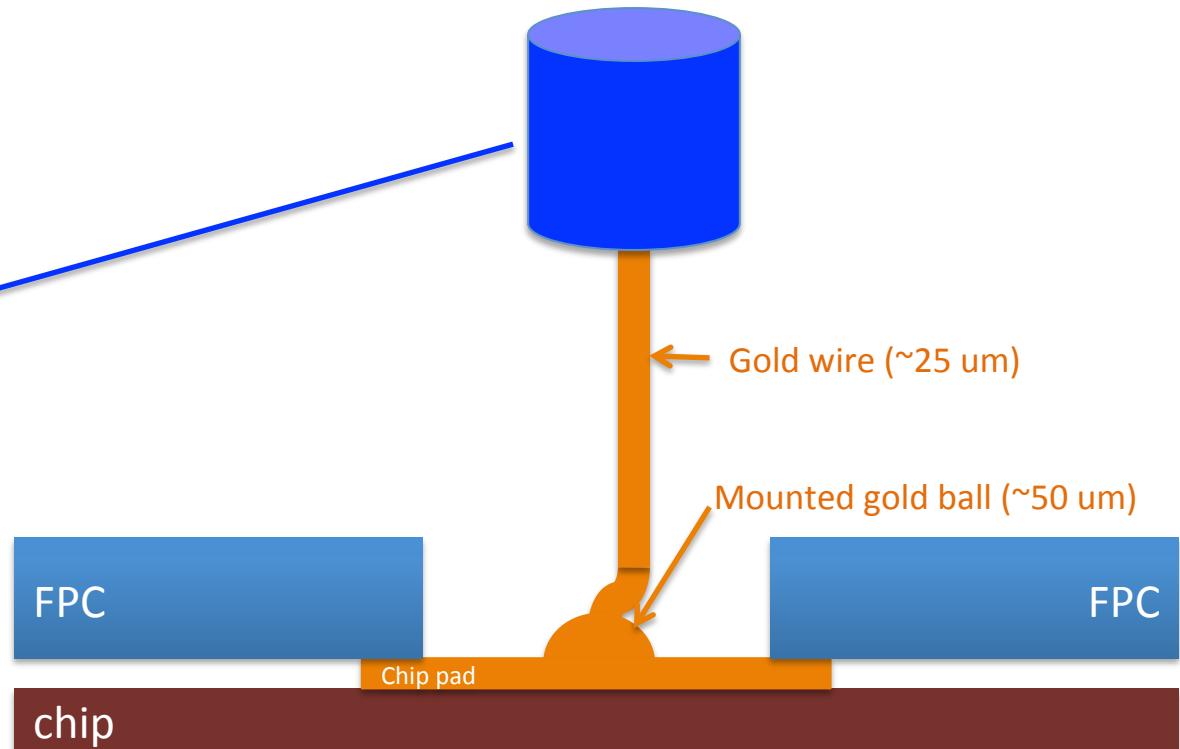
```
setOrgFile test.bmp //specify the reference scene picture
```

```
setModFile mod.bmp //specify the updated reference scene with highlighted feature contour
```

```
matchFeatureToCamera 0 0 0 //set the desired position (X/Y/Z) compared to the reference scene
```

R&D activities at Wuhan – Chip-FPC interconnections

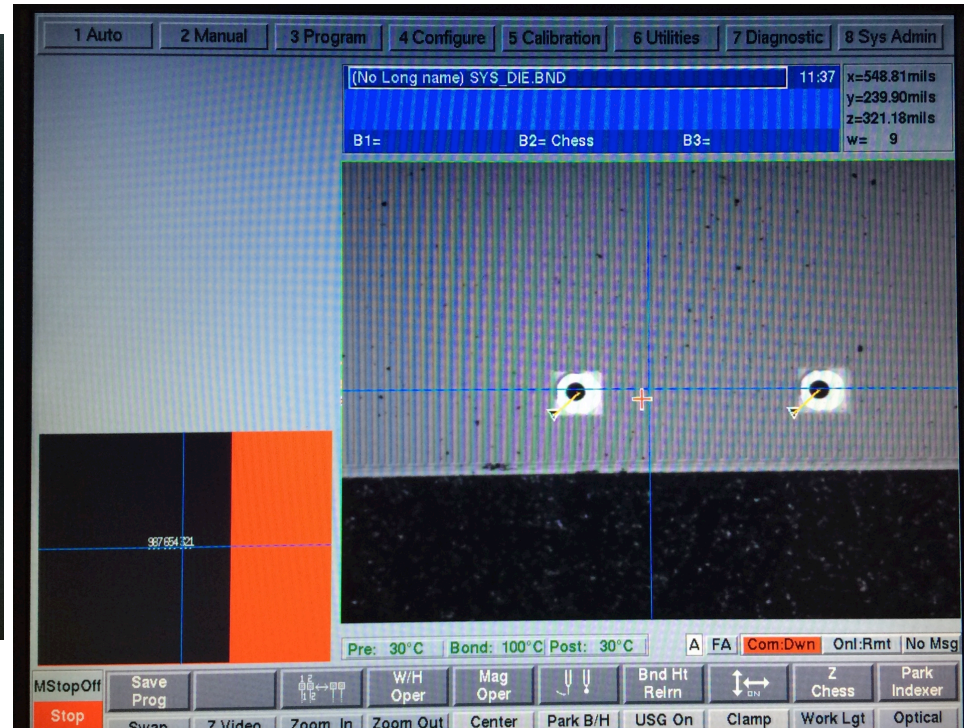
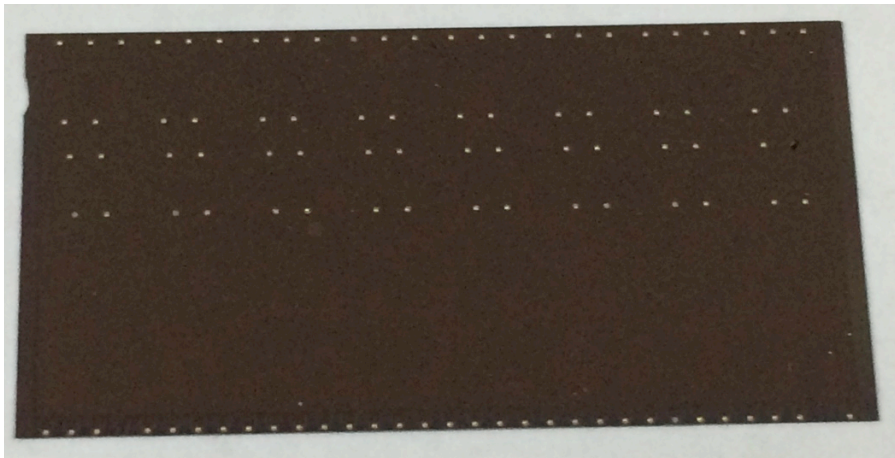
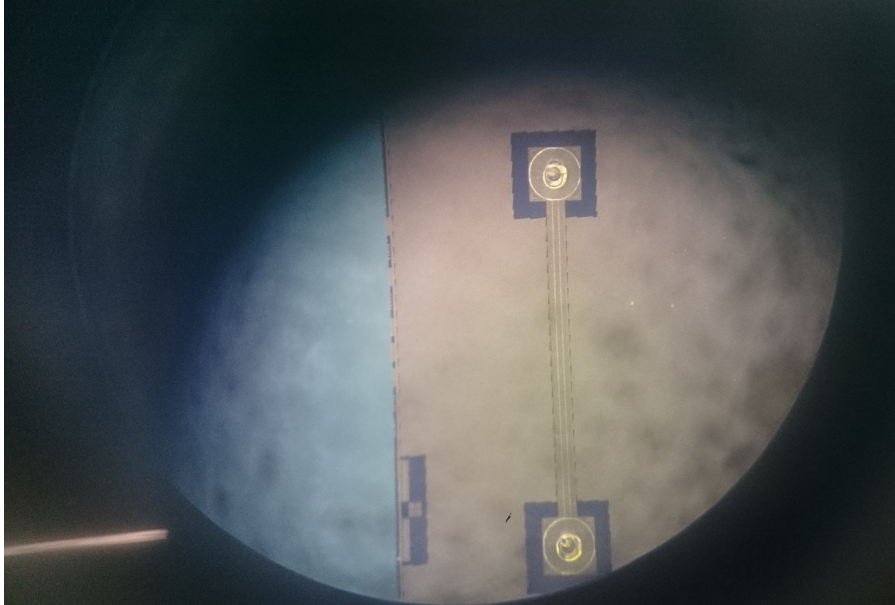
Step 1: mount ball on chip



Vacuum tooling to fix chip

R&D activities at Wuhan – Chip-FPC interconnections

Step 1: mount ball on chip

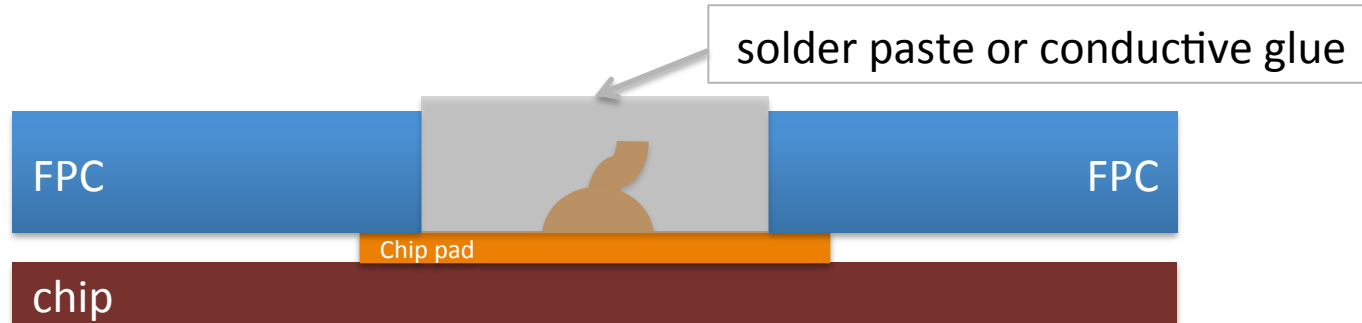


microscope picture

R&D activities at Wuhan – Chip-FPC interconnections

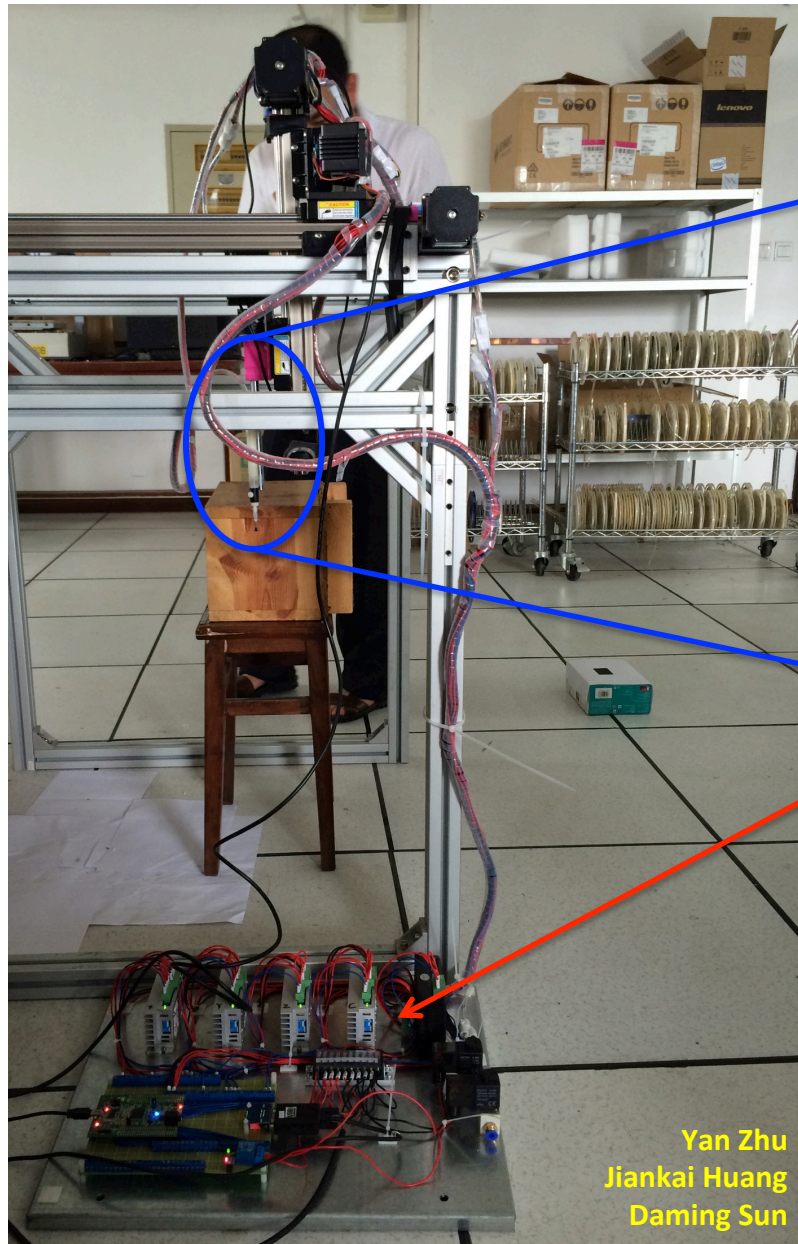
Step 2: chip placement on FPC (compatible to HIC assembly machine)

Step 3: fill FPC vias with solder paste or conductive glue by automatic dispenser machine

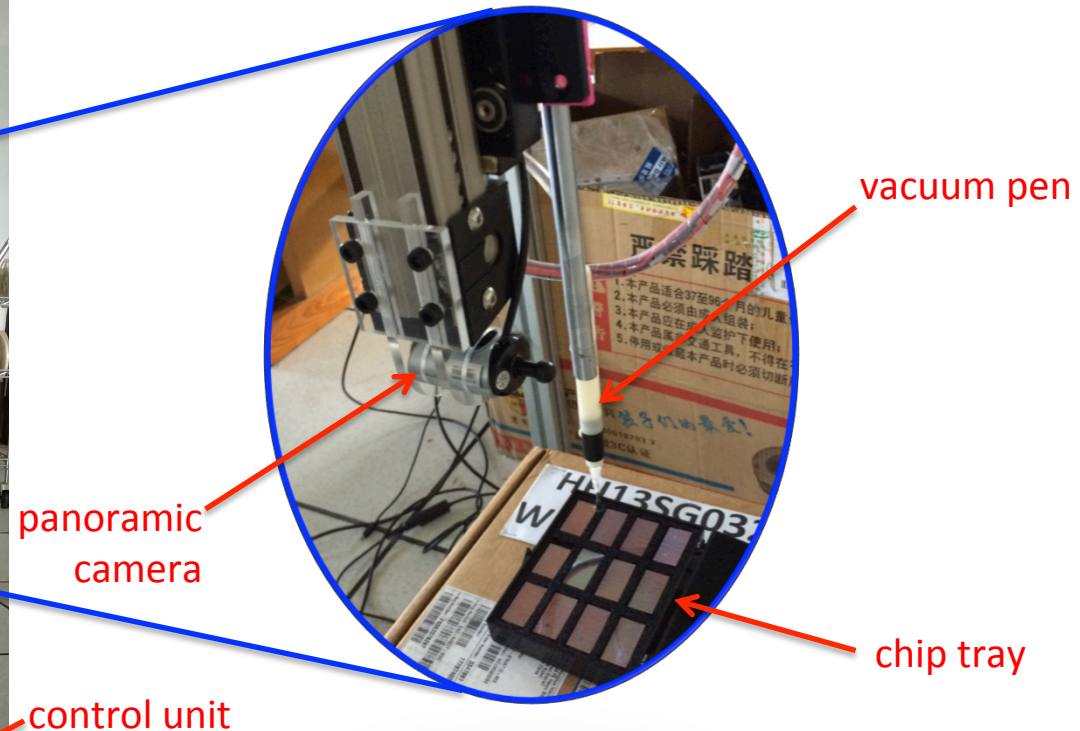


Thanks for your attention!

Activities at Wuhan – R & D on Vision Control System



Custom designed test stand:



- Automated video system: edge tracking
- Automated software-based shape analysis
- Fully programmable interface (PC)
- Wide travel range in XYZ, and rotatable in XY plane
- ~100 microns XYZ scale resolution
- Binocular to be installed close to vacuum pen to determine distance to object in Z direction

Yan Zhu
Jiankai Huang
Daming Sun

Manpower preparations

- Mangmang An (phD student, module assembly training at CERN)
- Chaosong Gao (phD student, chip design at CERN)
- Jiankai Huang (Master student, automatic assembly machine R&D)
- Jun Liu (electronic technician)
- Daming Sun (Machining engineer)
- Xiangming Sun
- Yaping Wang
- Yan Zhu (Master student, vision control software R&D)